



AMKOR'S RF TEST AND CHARACTERIZATION OFFERINGS

- ▶ Development support from design to production to automated product test
- ▶ Design optimization
- ▶ Electrical simulation
- ▶ Electrical bench test and characterization
- ▶ Test automation

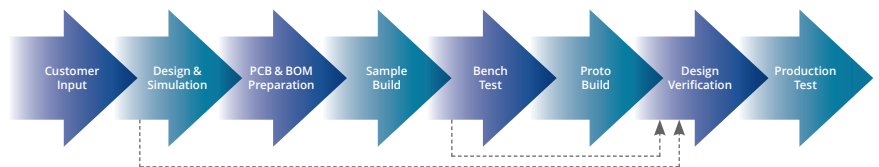
RF Characterization and Test

Amkor Technology offers advanced RF product characterization and test services with state-of-the-art simulation, design and bench test capabilities.

Development Cycle

Amkor's RF team utilizes design, simulation and RF measurements tools to characterize and optimize our customer's products throughout the development process, from device layout and simulation to final product verification and [production testing](#). This ensures our customer's final product meets the performance required in next-generation RF systems and follows the latest design rules for manufacturability and cost reduction.

RF Product Development Flow



Design and Simulation

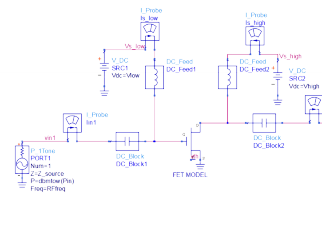
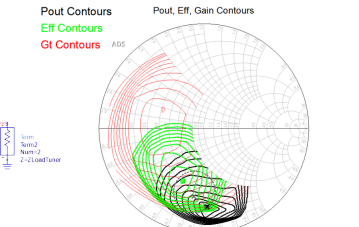
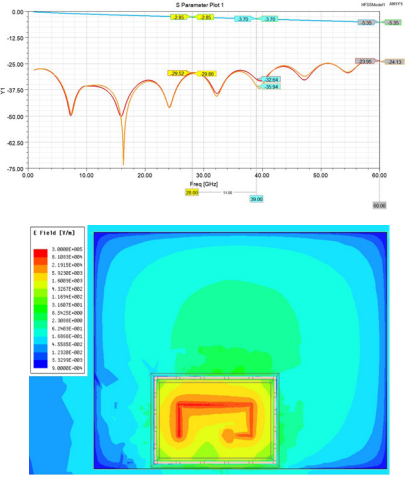
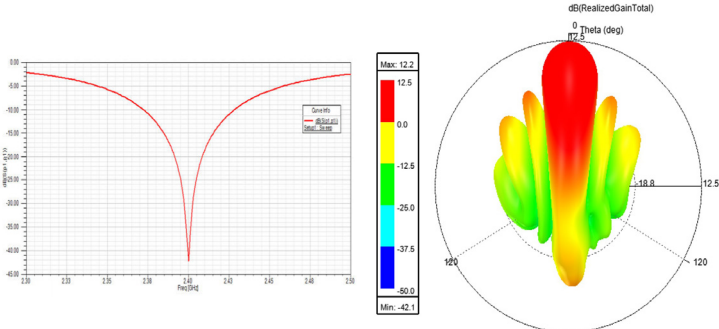
The design process is a critical step in the development of an RF product that requires close interaction with customers and engineering support during the entire layout phase. Amkor's experienced design engineers are trained experts and utilize the latest design tools and packaging technology. Amkor implements highly accurate layout and simulation tools to provide "best-in-class" services.

- ▶ Highly trained and experienced design staff
- ▶ High quality, reliable and accurate designs
- ▶ Design For Performance (DFP), Design For Cost (DFC) and Design For Manufacturing (DFM)
- ▶ Customer assistance to meet electrical requirements for RF devices

RF Test

Simulation Capabilities

The need to optimize package layout and electrical performance in next-generation RF systems is more crucial than ever. Our package layout tools are tightly integrated with our simulation tools. By working closely with customers to ensure the package layout meets the specified performance requirements, Amkor offers a reliable and cost-effective solution to RF design. Amkor's electrical team has experience simulating RF circuits, EM, antenna and signal/power integrity performance.

Category	Item	Purpose	Output
RF Circuit	Small or large signal simulation of linear or non-linear passives or active designs	Design, create, analyze, and verify RF circuits and systems	<div> <div>Load-pull bench schematic</div>  </div> <div> <div>Simulated load-pull contour display page</div>  </div>
	2D: Computation of S-parameters, surface currents, fields for planar circuits for topologies such as microstrip, stripline, coplanar waveguide, etc.	Analyze 2D and 3D EM performance	
RF EM	3D: Modeling of arbitrary 3D shapes, that may include bond wires, finite dielectric substrates, etc.		
Antenna	Phase/Impedance Matching	Miniaturization of antenna, optimization of channel bandwidth, antenna interaction with other components and performance optimization	
	Radiation Pattern		
	Gain		
	Return Loss		

Simulation Tools

- ▶ Ansys – HFSS, Q3D, Siwave, TPA, Designer
- ▶ Keysight – Advanced Design System (ADS)

RF Test

Bench Test

Amkor's RF test engineers have extensive experience designing bench test hardware and software to validate, analyze and optimize device performance. Bench testing is a critical phase in our customers' development process for next-generation RF systems. Working with Amkor's RF team during the bench testing and validation phase of the development cycle provides important results that aid in production test development. Amkor offers a wide range of test capabilities from general electrical measurements to test solutions tailored for specific RF products.

General Bench Test Capability



5G (mmWave)



IoT



LTE



Wi-Fi



Bluetooth

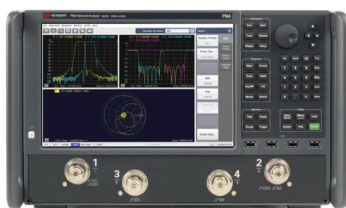
RF Bench Test Equipment



Probe stations
(single and double sided)



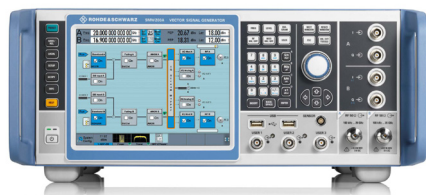
Impedance tuner
(0.6 GHz to 50 GHz)



Network analyzer
(10 MHz to 67 GHz)



Signal & spectrum analyzer
(2 GHz to 67 GHz)



Vector signal generator
(100 KHz to 40 GHz)



Radio communication
tester

All images are property of their respective companies.

RF Test

Test Automation Solutions

Test automation is essential for accuracy and time-efficiency of Amkor's RF measurement solutions. Amkor's RF test experts provide a wide range of test automation solutions from integrated DUT (Device Under Test) control to RF and EE instruments to meet our customer's test requirements in time.



Visit amkor.com or email sales@amkor.com for more information.



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